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# ORAL MANIFESTATIONS OF CHRONIC RENAL DISEASES IN PEDIATRIC POPULATION

Dental Science

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## ABSTRACT

Chronic renal disease is defined as a progressive and irreversible decline in renal function associated with a reduced glomerular filtration rate (GRF). It is characterised by gradual reduction in the number of functional nephrons sufficient to produce alterations in the well-being and hampering the organ.GRF rate falls less than 60 ml/min. The common causes for chronic renal failure are congenital anomalies of the kidney and urinary tract (CAKUT), steroid-resistant nephrotic syndrome (SRNS), chronic glomerulonephritis (e.g. lupus nephritis, Alport syndrome) and renal ciliopathies. Infants with congenital chronic kidney disease (CKD) can have polyuria, salt-losing nephropathies and electrolyte disturbance, prematurity-related feeding intolerance, recurrent vomiting. Childhood CKD presents clinical features that are specific and totally peculiar to the paediatric age, such as the impact of the disease on growth. In addition, some of the typical characteristics of paediatric CKD, such as the aetiology or cardiovascular complications. The National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (NKF-K/ DOQI) published a guideline on CKD, which included a classification system for CKD severity, independent of cause, and applicable to children. A comprehensive review of renal diseases with their manifestation is illustrated.

## KEYWORDS

## INTRODUCTION:

Chronic renal disease is defined as a progressive and irreversible decline in renal function associated with a reduced glomerular filtration rate (GRF). It is characterised by gradual reduction in the number of functional nephrons sufficient to produce alterations in the well-being and hampering the organ.[1]GRF rate falls less than 60 ml/min. The common causes for chronic renal failure are congenital anomalies of the kidney and urinary tract (CAKUT), steroid-resistant nephrotic syndrome (SRNS), chronic glomerulonephritis (e.g. lupus nephritis, Alport syndrome) and renal ciliopathies.[2] Infants with congenital chronic kidney disease (CKD) can have polyuria, salt-losing nephropathies and electrolyte disturbance, prematurity-related feeding intolerance, recurrent vomiting.[3] Childhood CKD presents clinical features that are specific and totally peculiar to the paediatric age, such as the impact of the disease on growth. In addition, some of the typical characteristics of paediatric CKD, such as the aetiology or cardiovascular complications.[3,4] The National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (NKF-K/ DOQI) published a guideline on CKD, which included a classification system for CKD severity, independent of cause, and applicable to children. This classification system identifies five stages of CKD based on the level of GFR. CKD is now defined by the presence of kidney damage (for example, any structural or functional abnormality involving pathological, laboratory or imaging findings) for≥3 months or a GFR< 60 ml/min/1.73 m2 for ≥3 months.[5] Glomerulonephritis accounts for 14% of cases which is the leading cause in children older than 12 years of age and there are variations of the cause's distribution with ages and races, according to North American Paediatric Renal Trials and Colloborative Studies (NAPRTCS) annual report. The chronic glomerulonephritis is the main reported cause of CKD in various studies and this may be related to high prevalence of bacterial, viral, and parasitic infections that commonly affect the kidneys in developing countries, as well as a different age distribution dies from Southeast Asia, Latin America and Caribbean area with a prevalence ranging from 30 to almost 60%.

### Complications of chronic renal disease:

Children and adolescents share common complications of CKD like anemia, hypertension and cardiovascular disease with their adult counterparts. However, there are certain complications which are special among paediatric patients. Growth retardation and maldevelopment of neurocognitive skills are chief among them.

### 1. Growth and development:

North American Pediatric Renal Trials and Collaborative Studies (NAPRTCS) registry data has revealed that about one-third of pediatric patients have short stature. Even after advancement in the therapy of CKD about 30 to 60% of patients have short stature.[8]

### 2. Neurocognitive skills impairment and quality of life:

Long term follow up of children diagnosed with CKD exhibit certain psychosocial issues due to multiple factors . Lack of independence, dependence on dialysis, multiple medications, poor quality of life, short stature and excessive parental indulgence compared to their healthy peers leads to a sense of inferiority complex, alienation and depression among these children.[9]

### 3. Anemia:

Anemia is most commonly seen in patients with chronic renal failure. Decreased erythrocyte survival, hemolysis, erythropoietin deficiency and blood loss from gut and during dialysis are among the predominant causes of anemia[10]. Anemia is attributed to impairment of neurocognitive skills, poor quality of life, increased fatigue, generalised weakness, and cardiomyopathy among these patients.[11]

### 4. Hypertension:

Hypertension, the risk factor for cardiovascular disease, has been frequently observed among CKD patients. Among these, patients with glomerular diseases had a higher incidence and required multiple antihypertensive drugs as compared to those with other etiologies.[12]

### 5. Cardiovascular disease:

Cardiovascular disease is the most common cause of mortality among pediatric CKD, arrhythmia and cardiomyopathy being the most common. Uncontrolled hypertension, anemia, fluid overload, left ventricular hypertrophy, vascular calcification, hyperparathyroidism and chronic inflammation are major factors among them.[13]

### Clinical manifestations:

### Neurological disorders:

Fatigue, lethargy, sleep disturbances, headache, seizures, encephalopathy, peripheral neuropathy including restless leg syndrome, paresthesia, motor weakness and paralysis

### Hematologic disorders :

Anemia, bleeding tendency-due in part to platelet dysfunction

### Cardiovascular disorders :

Pericarditis, hypertension, congestive heart failure, coronary artery disease and myocardiopathy

**Pulmonary disorders:**
Pleuritis, uremic lung

**Gastrointestinal disorders :**
Anorexia, nausea, vomiting gastroenteritis, gastrointestinal bleeding and peptic ulcer

**Metabolic endocrine disorders:**
Glucose intolerance, hyperlipidemia, hyperuricemia, malnutrition, sexual dysfunction and infertility

**Bone, calcium phosphorus disorders:**
Hyperphosphatemia, hypocalcemia, tetany, metastatic calcification, secondary hyperparathyroidism, 1,25-dihydroxy vitamin D deficiency, osteomalacia, osteitis fibrosa, osteoporosis and osteosclerosis

**Skin disorders:**
Pruritus, pigmentation, easy bruising and uremic frost

**Psychological disorders:**
Depression, anxiety, denial and psychosis

**Fluid and electrolyte disorders:**
Hyponatremia, hyperkalemia, hypermagnesemia, metabolic acidosis, volume expansion or depletion.[14]

**Oral manifestation of chronic kidney disease:**
About 90% of the patients with renal diseases show oral signs and symptoms in soft and hard tissues. The reduced function of the kidneys results in an increase in the levels of urea in the blood and also in the saliva, where it will turn into ammonia. For this reason, uremic individuals have a characteristic halitosis, which also occurs in about one-third of hemodyalized patients.[15] A common oral symptom of CRF is the sensation of a dry mouth, which may be caused by restricted fluid intake (necessary to accommodate the reduced excretory capacity of the kidney), adverse effects of drug therapy, and the low salivary flow rate.[16]

Stomatitis, mucositis, and glossitis can cause pain and inflammation of the tongue and oral mucosa. Altered taste sensations, dysgeusia, as well as bacterial and candidiasis infections can develop due to the underlying renal diseases. The decrease in salivary production and increase in salivary pH and uremia are main cause of periodontal diseases in chronic renal disease. Apart from a decreased secretion of saliva, End Stage Renal Disease (ESRD) patients are usually restricted in fluid intake for concerns of volume overload . Xerostomia may predispose to caries, mucositis, and oral infection as the protective factors in saliva are diminished. Further, dialysis duration and end-stage renal failure significantly correlate with gingivitis, probing depth, attachment loss, and enamel hypoplasia.[17]

A frequent long-term complication of renal disease is renal osteodystrophy, a spectrum of bone metabolism disorders associated with different pathogenic pathways. These changes comprise bone demineralisation with trabeculation and cortical loss, giant cell radio transparencies or metastatic calcifications of the soft tissues. The patients are at increased risk of fracture during dental treatments, such as extractions. Diffuse involvements of the jaws occur with significant frequency and radiographic alterations of the facial skeleton may represent one of the earliest signs of the disease. In some patients, marked jaw enlargement and malocclusion may occur. Oral manifestations of renal osteodystrophy include tooth mobility, malocclusion, pulp stones, enamel hypoplasia, decreased trabeculation of cancellous bone, decreased thickness of cortical bone, radiolucent giant cell lesions, jaw fracture (spontaneous or after dental procedures), and abnormal bone healing after extraction. To avoid hypovitaminosis D and its consequences, it is therefore necessary to administer calcitriol or its analogs to compensate for the compromised production of 1,25 vitamin D, which occurs in the later stages of chronic kidney disease so that the classical functions of hormonal 1,25 vitamin D may be addressed.[18]

Disruptions during the histodifferentiation, apposition, and mineralization stages of tooth development result in tooth structure abnormalities (Mc Donald et al., 2011). In children with renal disease, incidence rates of enamel hypoplasia range from 31% to 83%.[19]

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